Applying Single Case Design Standards to a Brief Experimental Analysis: Does Meeting Evidence-based Standards Impact Student Outcomes?

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Abstract

Educators are often challenged with the task of identifying and implementing evidence-based interventions that are matched to a student’s individual needs. Brief Experimental Analysis (BEA) is a promising solution that involves selecting individualized interventions for students and matching these interventions to their needs. However, little is known of if this BEA process meets evidence standards. Brief Experimental Analysis follows a single case design framework and interventions are “tested” on students to determine the most effective one.

The What Works Clearinghouse (WWC) has developed standards for single case design research (Kratchowill, Hitchcock, Horner, Levin, Odom, Rindskopf, & Shadish, 2010). These standards were developed to help determine if a single case design meets “evidence standards.” An important purpose of this study is to develop a checklist that can apply the WWC standards to Brief Experimental Analysis. Using a coding checklist based on the standards developed by the WWC and adapted by Maggin, Brisch, and Chafouleas (2012), the present study applies these standards to a Brief Experimental Analysis (BEA) of reading fluency interventions. A partnership between the University of Wisconsin-Eau Claire Academic Intervention Clinic (AIC) and local elementary schools allowed the implementation of 7 BEA single case designs with 2nd and 3rd grade students. The interventions selected for the BEA were evidenced-based and were delivered through an after school program.

Preliminary results show that only 57% of the BEA cases meet the design standards with 36% of BEA’s demonstrating moderate evidence of an effect. Overall, the BEA designs demonstrated a positive growth in student oral reading fluency performance and should be considered a beneficial design for meeting students’ individual needs. Additional research is needed in the area of BEA effectiveness.

Research Questions

1) How can the WWC single case design standards be applied to BEA?
2) To what extent do the BEAs conducted in our program meet evidence standards?
3) Does the degree to which the BEAs meet standards impact outcomes for students?

Participants

School Partnerships— one elementary school:
- ~70% of students qualify for free and reduced lunch.
- 4 Boys, 3 Girls, 4th Grade: 3, 3rd Grade: 2, 2nd Grade: 2
- Students referred by teachers due to reading concerns

Interventionists:
- Undergraduate students at UWEC
- Variety of majors & years in school

What is BEA?

A “test-drive” reading interventions to select the most promising intervention for the student
- Can match the intervention to the student based on what works best
- Provides an opportunity to assess the effectiveness of an intervention before implementing it for a significant amount of time
- Provides an opportunity to access the feasibility of an intervention
- “Winning” intervention is selected and implemented throughout the semester to help the student improve oral reading fluency.

Repeated Reading + Error Correction (RR+EC): The student reads the passage three times. During the third read, the student reads the passage for one minute and the interventionist records errors.

Listening Passage Preview (LPP): The interventionist reads the passage aloud to the student, and then the student reads the passage for one minute while the interventionist records errors.

Incentive [I]: The student reads the passage for one minute with the interventionist corrects errors. After the first read, the interventionist will calculate the correct words read and ask the student to read the passage again for another minute. The student is told that if they beat their score by 20% they will be allowed to select a prize.

Measures

- Baseline data and data during the BEA phase was collected using passages developed from a previous study (Therrian, Wickstrom, & Jones, 2006)
- Data during the extended analysis phase of the selected intervention were collected using passages developed by EasyCBM.com (University of Oregon, 2014)
- Progress monitoring data were collected using passages from the Formative Assessment System for Teachers (FAST) (Christ, Ardoin, Monaghan, Van Norman, & White, 2013).

Intervention Effectiveness

<table>
<thead>
<tr>
<th>Percentage of Non-Overlapping Data Points</th>
<th>Description</th>
<th>Number of Cases Baseline Intervention</th>
<th>Number of Cases BEA: RR+EC</th>
<th>Number of Cases BEA: LPP</th>
<th>Number of Cases BEA: Incentive</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 90%</td>
<td>Highly Effective</td>
<td>1</td>
<td>6</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>70-90%</td>
<td>Fairly Effective</td>
<td>5</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>50-70%</td>
<td>Questionable Effective</td>
<td>--</td>
<td>1</td>
<td>1</td>
<td>--</td>
</tr>
<tr>
<td>&lt;50%</td>
<td>Uneffective Treatment Effect</td>
<td>1</td>
<td>--</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

What Works Clearinghouse Single Case Design Standards

To Meet Evidence Standards:
- Independent variable must be systematically manipulated
- Each outcome must be systematically measured over time by more than one assessor and inter-assessor agreement (IAA) must be collected on at least 20% of the data points in each phase and IAA must meet minimum thresholds
- Study must include three attempts to demonstrate an intervention effect at three different points in time or with three phase repetitions
- For a phase to qualify as an attempt to demonstrate an effect, it must have a minimum of three data points (one data point is deemed appropriate for BEA designs)

Evidence of Causal Relationship (if meets evidence standards):
- Document the consistency of level, trend, and variability
- Document the immediacy of the effect, the proportion of overlap, the consistency across phases, and comparing patterns
- Examine external factors and anomalies

References


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